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TREATISE
ON THE
MANAGEMENT of POTATOES;
OR,
A NEW METHOD
OF CURING THE
CURL'D-TOPT DISORDER,

THE AUTHOR promised in his proposals
that no more of his TREATISE should be printed
than the number subscribed for; and as it is en-
tered in STATIONERS HALL, any person pre-
suming to print it will be prosecuted. But as
Mr. W. TESSEYMAN and Mr. R. SPENCE,
Booksellers in York, have subscribed for a small
number of the books, which (being their own pro-
perty) they have a right to dispose of them as
they think proper; of this it was necessary to
take notice.



T R E A T I S E

MANAGEMENT of POTATOES;

A NEW METHOD

Of Removing and Preventing the Disorder thereof,

CURLD TOPS,

And restoring them to their Primitive State and Perfection.

Wherein the **DISORDER** is considered

I. Its **NATURE.**

III. Its **VARIOUS CAUSES.**

II. Its **MARKS and EFFECTS.**

IV. Its **CURE.**

**WITH REMARKS UPON THE
USUAL MANAGEMENT of POTATOES,**

WITH REGARD TO

**SETTING, TIME of GROWTH, TAKING UP, PUTTING
into the PYE, &c. &c.**

WHEREIN IS CONSIDERED

The VARIOUS ERRORS which are frequently committed
in each **PARTICULAR,**

And PROPER DIRECTIONS given therein to remove
and prevent the **DISORDER, &c.**

By WILLIAM RALEY,

*Student in Physic and Botany, in Barmby upon the Moor, near
Pocklington, Yorkshire.*

Y O R K:

PRINTED FOR THE AUTHOR,

M DCC LXXXII.

ADVERTISEMENT.

I KNOW it is expected that I shall give directions to cure those Potatoes which are to be set the next setting-time, and thereby prevent the ensuing crop from being disordered, which is a grand mistake; for how can that be reasonably expected? Seeing I cannot prevent the errors which have already been committed in the general management thereof. And as the sound cannot be distinguished from the unsound at the time of setting, they must be set as they come to hand, (according to the directions which I have given in PART IV. SECT. V.) and in the time of their growth they may be marked, so as to be known when they are taken up; for which reason I begin with them in the time of their growth. Whenever a number of sound Potatoes are procured, if they are afterwards managed according to my directions they will be kept so.

MARCH, 1782.



P R E F A C E.

AS Potatoes in England have for several years past been greatly contaminated with a disorder commonly call'd *Curl'd-Tops*, and considering the great loss and inconvenience which the country in general have suffered thereby, I have often thought it were to be lamented that no person had been induced to promote the public good, by publishing some directions for the right management of Potatoes. Seeing such a work is so greatly wanted, (tho' I charitably hope, and am fully convinced, that there are several able Gardeners, Botanists, &c. whose abilities in such an undertaking are much superior to mine) yet as such a performance has been long wished for, without effect, and as I have had several years experience in the management of Potatoes, and have thereby gained some knowledge thereof, I thought it might be both agreeable and advantageous to the Public for me to publish the same: this was the chief motive I had in this attempt. Therefore I hope the form thereof will not be so much regarded as the matter; and although it may want somewhat of the grammatical and rhetorical style, yet I am in hopes it will be sufficient to explain my meaning to the indifferent reader, and perhaps may prove as a spur or means of exciting a more able hand, which may embellish the work, and render it more agreeable to the politer part of mankind. Until such time, I humbly leave it to the consideration of the unprejudiced reader. But as it chiefly concerns the farmers, who (in general) are a set of illiterate and incredulous people, unacquainted with
a nature

nature and natural causes, and frequently too rashly condemn and ridicule every thing that is not within their narrow sphere, therefore I expect it will meet with their contempt ; but as it is not wholly confined to such people, I am in hopes it will meet with some who are able to discern the truths, improve the hints, correct the errors, and give the work its due merit.

I know the book will not meet with the general applause which I do wish, for I am sensible that the public in general, (exclusive of a few) want, and fully expect the disorder of potatoes to be removed and prevented, by some particular unknown specific or curious secret, to be performed in some one particular circumstance only ; and that without labour or expence, or having any regard to the management thereof in general.

But when we thus pretend to assist Nature by those imagined secrets, we thereby very often neglect the laws of Nature, and such means as assist her in the work of vegetation ; and instead of assisting, we often suppress her ; for Nature acts by uniform laws, which cannot be broken without frustrating her intentions of bringing her work to perfection.

Suppose I were to direct the Potatoes to be infused or steeped together for some certain time, in some particular kind of liquor, cut them in some particular manner, set only such as have but a certain number of eye-holes, &c. and that there need be no notice taken in any other particular circumstance, only put them into the earth, and they will be certain to grow and do well ; this would be welcome news, and would meet with almost
universal

universal approbation, until experience forbid the erroneous practice ; for depending upon such groundless secrets, are as grasping at a shadow, instead of holding the substance.

For although each of these (and the like curious secrets) have some effects, yet they but very seldom produce the desired effect ; therefore I shall take no further notice of them, but lay down such a method as is both reasonable and practical, which (if properly regarded) will infallibly answer both what can reasonably be required, and I propose, *viz.*—To improve those that are sound, and to keep them from being disordered. I do not pretend to cure those that are already disordered, although I believe it is possible, (and perhaps the directions which I shall give might do it) but would require a long time to complete the work ; and as we have those that are sound, it will be best chiefly to regard them, for the disorder is easier to be prevented than cured.

Perhaps some may think that I am too prolix in my remarks and directions in the following work, but I had rather commit an error in this respect, than leave out any thing which might be of use ; for I think all or most of them are absolutely necessary to be observed, especially when the Potatoes are intended for setts, which is my chief design in writing this book : but when they are only intended for common use, there need not be so strict a regard had to each particular ; but then it ought to be observed, that they must be kept a part from the other intended for setts, for although there may be no visible difference between them, yet if any neglect in the management thereof hath been committed, it may im-

pair them, and be sufficient to lay a foundation for the disorder.

All possible care ought to be taken to restore Potatoes to their primitive state and perfection, and to keep them in a sound and vigorous condition; for a neglect in this respect makes them degenerate, and become of a deleterious nature, and not fit for food.

Potatoes are naturally apt to degenerate into a deleterious or hurtful nature, and require a particular management and care to prevent them therefrom;—it is for want of this that makes them productive of those pernicious or bad consequences which the Physicians justly condemn them for; they are a species of Solanum or Nightshade, (of which there are various kinds, all of them of a deleterious quality, some in a greater and others in a lesser degree) and are a native and grow spontaneous in the warmer climates, where they are more replete with a narcotic sulphur than in England, where the length and heat of the summer is not sufficient to give them their full strength; and being thereby deprived of some of their narcotic sulphur, and replenished with nitrous salts, which abound more in England than in the warmer climates, and are a corrector of their narcotic sulphur:—Hence they become a proper nourishment, and fit for food. But whenever they are deprived of these nitrous salts, they become pernicious, which is the case with Curl'd-Top Potatoes. How they are deprived of these nitrous salts, I shall show in Part III. and Section III. of this work.

To make it obvious that nitre abounds (in a particular manner or degree) in Potatoes that are in a sound
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and vigorous state, there need only be some of their stalks with the leaves hung up to dry in a dry shady place, and when they are thoroughly dry, take one of the stalks and kindle one end thereof in a fire, and it will burn like a piece of touch-paper, viz. (paper that has been prepared with nitre) by reason of the nitre it contains; and as it burns, the nitre will flash and emit very brilliant sparks and rays of light; and if the surface of the smaller parts of the stalks (especially not far from the leaves) be carefully inspected, the nitre may be seen of a whitish brown colour upon the same; and, by art, there may be a considerable quantity of nitre taken therefrom; but the stalks of rank Curl'd Top Potatoes will not produce the same effects; for if any nitre is found in them, it is but very little in quantity; but a more particular difference between them may be discovered by analyzing them according to art.

Every plant in its natural state and perfection contains a due quantity of salts, sulphurs, &c. which are their active parts, and wherein is contained their virtues; but some plants are more replete with sulphurs, others with salts, &c. which causes them to be very different in several respects, and have different effects upon living bodies, when received as food or medicine; but when they are deprived, in any degree, of their native salts, sulphurs, &c. or are replenished with too great a quantity of those of a different quality, they are (in some degree) changed into a different nature, and will produce different effects.

Thus a poisonous plant may be rendered less poisonous, and a salutary plant, impaired in its salutary and friendly

friendly nature, by being planted in different places, and manured with different kinds of salts, sulphurs, &c. or with different mixtures thereof. And if a plant that is a native of a cold watery place be taken from thence, and planted in hot and dry soil; or, a plant that is a native of the sea coast, where it is frequently moistened with the salt water, be planted in a place where no such water comes, they will grow, but will lose most of their primitive virtues and effects, and be much altered in several respects, too tedious to mention; for the God of Nature hath so ordered it, as to place each plant in its proper place, where it is nourished in a peculiar manner with proper salts, sulphurs, &c. according to its nature; and although the same kind of plant may sometimes be found growing in places very different in quality, (which frequently happens by accident) yet they will not be possessed of the like virtues. This digression may help to elucidate the point in hand, and although it may appear only hypothetical, yet experience will corroborate the same, and prove it to be no chimera, but to have some foundation of truth.

INTRODUCTION.

INTRODUCTION.

POTATOES in England, (especially of late years) have greatly degenerated, and are become so contaminated with a disorder, commonly called *Curl'd-Tops*, which makes such a quick progress, that unless it be prevented, they will, in a few succeeding years, be but of very little use to us.

Very various has been the opinions of people concerning this disorder in Potatoes, and its cure. Some are of an opinion that the disorder is only a degeneration of them, by reason of their being cultivated too long a time in England, where they are not a natural product. This is true in some respects, but the reason of their thus degenerating, and its more apparent effects in these later years than before, has not as yet been made public.

Some people say, the disorder is caused by reason of Potatoes being too long a time cultivated by the root, without raising them afresh from seed, or their being set too long or often in one and the same piece of ground; others say, it is caused by a kind of worm or insect, which impair either the root or top, or perhaps both, or from a kind of deformity upon their surface, commonly called *Canker*, &c.

Others say, the disorder is caused by, or proceeds from some of the following circumstances, viz.—Their being
set

set either too soon, or too late, in the spring; their being taken up too soon, or suffered to remain too long in the earth; their being manured with some particular kind of manure that is contrary to their nature, the season of the year being too hot and dry, or too cold and moist; their being cut into too small pieces for setts; their being set whole; their being infected by the farinas of those that are disordered, &c. &c.

And although such-like circumstances as are above-mentioned have each of them their particular effect upon Potatoes, and, in some degree, impair or weaken them in their vegetative property, and thereby lay a foundation for the disorder; yet as no one of them in particular is the grand and only cause thereof, they should not be considered simply as such, but only as means which tend thereunto. Therefore, the disorder is not to be supposed to arise simply from any one particular circumstance or cause, but rather from a multiplicity thereof, sometimes one, sometimes another, and sometimes several of them together: For if the disorder proceeded from any one simple circumstance or cause, and it were taken away, the effect would infallibly cease; hence a cure. Whereas, if a number of circumstances or causes are taken away, yet if any one remain, (be what it will) the disorder will in some degree remain also. Therefore, whatever pretence any person may make of having found out or discovered the true and only cause of the disorder, it will be found an illusion; for let it be what it will, if any other circumstances or causes (which I shall mention) remain, the disorder will in part remain also.

I shall

I shall next make some remarks and observations upon the various opinions and circumstances above-mentioned.

And First, On Potatoes being planted too long a time in England.

If this were the only cause of the disorder, we might for ever despair of removing or preventing it, unless we were to destroy all the Potatoes which we already have in England, and be constantly supplied with those from some other country. But we have no need of this, seeing Potatoes flower and produce fruit in very great perfection in these parts; therefore I make no doubt but we should highly preserve Potatoes, if they were properly managed in every respect as they ought. Besides, if this were the only cause of the disorder, it would in general have the like effect throughout the whole country, whereas it is the contrary; for Potatoes are disordered in one part, and not in another, which is chiefly owing to the different management thereof: for some people have kept their Potatoes entirely free from the disorder, until they purchased from some other person. There are others who never have any Potatoes free from the disorder for any time together: though their sets be of whatsoever kind, and quite free from the disorder, yet by errors frequently committed in the management, they soon become disordered, the owner not knowing the reason thereof; for the disorder is of a progressive nature; and its effects at the first are scarcely visible; but, in process of time, they become apparent, and then the cause is frequently attributed to some late circumstance, when perhaps it had its rise from some error committed long before.

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Secondly,

Secondly, On Potatoes being too long a time cultivated by the root.

This is not the only cause of the disorder; if so, all Potatoes (especially of one kind, and raised from the same kind of seed) would degenerate, and produce Curl'd Tops nearly at one and the same time; but experience proves to the contrary. Although this is not the only cause of the disorder, yet it has a very great share therein, and ought to be strictly regarded; for unless we particularly observe it, all other endeavours will be in vain: so likewise if attended to, and any error committed in other circumstances, yet that will be sufficient to lay a foundation for the disorder, and, if continually repeated, will not fail of completing it, notwithstanding the Potatoes had been but lately raised from sound and perfect seed.

That there is a natural degeneracy in Potatoes from want of being raised afresh from seed, is evident from experience in similar cases; for we cannot raise such perfect, vigorous plants, from the cuttings and slips of such herbs, plants, &c. which produce perfect seed, (especially if the cuttings or slips were taken from such herbs or plants as have often suffered the like treatment) as from their seeds. There are other herbs, plants, &c. which produce no perfect seed, and these are propagated and preserved by their roots: Nature in each particular seems to direct us to a proper method of raising and preserving them in their greatest perfection.

The vegetative property of plants, whereby they are excited to propagate their own species, are distributed into all their parts, but the seeds are the very repository

tory thereof, and potentially contain the plant. When any seed has produced its own species, the young plant will require some time before it compleats its perfect state of maturity, after which it will be in a decline. What time each particular kind of plant requires to compleat its maturation, is, I suppose, as yet unknown, especially such as continue in a state of vegetation for a great number of years (as Potatoes do); yet I make no doubt but the time thereof is specified by the Great Author of Nature, and we should endeavour to gain the knowledge thereof as much as possible.

I suppose that Potatoes compleat their state of maturation in the course of about ten years, after which they begin to decline. And although every plant by Nature hath a specified time for it to compleat its greatest state of perfection in, yet by accident or mismanagement it may cut the work short, and in the end seem to die a natural death.

Thirdly, On Potatoes being set too often upon one and the same piece of ground.

This is not the only cause of the disorder, yet it is not without its effects therein; for the earth in its natural state contains various kinds of salts, sulphurs, bituminous substances, &c. And although each plant contains more or less of each of these substances, yet some plants are more replete with one kind thereof than another (which may be known by analyzing them by the art of chymistry); therefore whenever any piece of earth is often cultivated with the same kind of herbs, plants, &c. it becomes too much exhausted of these substances, which such plants naturally attract for their

nourishment; in consequence of which, the plants will not vegetate to perfection, unless the earth receive manure as will supply it with fresh substances, agreeable to the nature of the plants, herbs, &c.

Fourthly, On Potatoes being disordered by a kind of worm or insect.

These scarcely deserve any observation, for they are in no wise the cause of the disorder, and only affect Potatoes in some respects not worth notice; and those which they do affect, are chiefly of the Curl'd Toot kind, which make a slow progress in their growth, giving these insects an opportunity of placing themselves amongst the foldings or curlings of the leaves. It seldom happens that insects infect any plants while they are in a vigorous or luxurious state; but if they are impaired and rendered languid or weak, they become a proper receptacle and nourishment for them.

As to worms affecting the roots or sets, they seldom (or perhaps never) do, if the Potatoes that are set were sound and whole; if they were not sound, but had bruises, holes, or cuts in them when they were set, it is no wonder that worms enter therein; and whoever sets them in such a state, most certainly acts contrary to both Nature and Reason.

Fifthly, On Potatoes being set too soon, or too late; taken up too soon, or too late, &c.

These (unless carried to an extreme) are in no wise the cause of the disorder, than as they expose the Potatoes to the frost, and accidents of the like nature.
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Their being manured with what is disagreeable and contrary to their nature, such as ashes that contain too great a quantity of caustic salts, &c. are detrimental to them, being chiefly the cause of their having rough spots upon them, called *Canker*, which hinders them in their growth; hence they become weak, and lay a foundation for the disorder. Too great a quantity of these caustic or alkaline salts act too violently upon their juices, putting them in too great a state of fermentation, and rendering them too hot and fluid, whereby they become too profuse, causing these excrescences upon the Potatoes, and a luxuriant top, while the Potatoes themselves remain small, and infected as above.

As to the season of the year being too hot, dry, cold, or moist, we cannot alter it in any respect, but ought to be content therewith, as knowing it to be the will of the All-wise Director of the Universe; yet we ought to use means to prevent the Potatoes from being hurt by frost, violent wet weather, &c. as much as possible, as I shall direct in the following work.

Sixthly, On Potatoes being cut into too small pieces for sets; and of their being set whole.

The cutting Potatoes in too small pieces is certainly a cause of the disorder; but, how small, I cannot tell. However, I know both by reason and experience that Potatoes should not be cut at all for sets; therefore the lesser pieces they are cut into, so much the worse; for if they are cut into very little pieces, they will scarcely grow at all. As cutting them into very little pieces almost entirely destroys their vegetative property, so if they are cut into somewhat larger pieces it will be destroyed

stroyed in a lesser degree, according to the size of the pieces which the Potatoe is cut into. It seems to be according to the design of unerring Nature, (and what I shall always advise) to set Potatoes entirely whole; for cutting them divides and impairs the continuity of their parts, and shews several reasons which forbid the practice; but they are too tedious to particularize at this time.

Seventhly and Lastly, On Potatoes being infected by the farinas of those that are disordered.

This is in no wise the cause of this disorder in Potatoes; for although there are several kinds of herbs, plants, &c. which do infect each other by their farinas, and thereby produce surprizing effects; yet it is to be observed, that each of these plants are not disordered or imperfect in themselves when they infect each other with their farinas, but in a state of perfection; because no imperfect plant produces a perfect flower, and no imperfect flower produces any perfect farina; neither does the incorporation of these different farinas produce disordered or imperfect plants, but such as are healthy and strong, although of a mungrel or bastard kind. But Curl'd Topt Potatoes are disordered and imperfect plants, which never produce any perfect flower or farina, and therefore cannot infect or impregnate other plants, nor can the farina act upon any part of a plant but the pistil or female part of the flower. There are Potatoes of the early kind which never produce any flowers, and yet become Curl'd Topt, which cannot proceed from the farina of any other plant, as they have no flower for the farina to act upon: in short, if the disorder

disorder in Potatoes were caused by the farina of disordered plants, it might soon be removed by taking up all those of the Curl'd Topt kind before the time of their flowering; but as it is not a cause of the disorder, we need not pay any regard thereto.

REPORT

as follows:

PART I: Of the nature of the character.

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O F T H E
CURL'D TOPT DISORDER

O F
P O T A T O E S.

THIS disorder of Potatoes is a weakness and defect thereof, proceeding from such things as are preternatural, or contrary to the common order of Nature, whereby they are depraved and become languid and unable to perform their work of vegetation to perfection. But before we attempt to remove and prevent the disorder, it is necessary, First, to consider its nature. Secondly, Its marks and effects. And, Thirdly, Its various causes; which I shall divide into Three Parts, as followeth:

PART I. Of the nature of the disorder.

The nature of this disorder of Potatoes is two-fold; either on impairment or a depravation in some particular part thereof only, as the root, stem, or leaves; or else of the whole plant in general; and therefore is to be divided into two kinds, as proceeding from two different causes: the one, when they are emaciated and their vegetative property either in part or wholly exhausted, by being too long exposed to the open air, or by being kept too dry and warm, or whatever else consumes
too

too much of their radical moisture, whereby they become flacid and exhausted, which renders them so languid and weak that they cannot perfect their work of vegetation; thus they become impaired: the other, when the continuity of their parts are either impaired, or wholly broken and destroyed by frosts, violent bruises, &c. whereby they are vitiated, and oft times are brought to a state of putrefaction; thus they become depraved.

P A R T II.

Of the marks and effects of the disorder.

These I shall divide into Two Sections. First, the marks and effects of the disorder when caused by the Potatoes being kept too long a time in the open air, dryness, heat, &c.

Secondly, The marks and effects thereof when it is caused by frost, bruises, &c.

S E C T I O N I.

1. When the disorder is caused by the Potatoes being kept too long a time in the open air, dryness, heat, &c. the Potatoes are soft and flacid, their skins withered, and; if much emaciated, become wrinkled. When they are cut with a knife, they appear soft, tough, and greatly exhausted. The smell of them are not much altered from that in their natural state. When they are made ready for eating, (especially by boiling) and their skins taken off, they appear tolerably dry, and when they are cut with a knife they appear tolerably compact, dry, and mealy; the smell and taste of them are also tolerable, yet in a much lower degree than in those which are in

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a state

a state of perfection. When they are roasted, they become too much exhausted, and appear tenaceous and solid, parting in the middle; the smell and taste of them in this case is disagreeable, and the more they are roasted they become so much the worse.

2. The next thing to be considered is, how heat, dryness, &c. exhausts and emaciates Potatoes, so as to render them unable to perform their work of vegetation to perfection, &c.

3. Potatoes, when in their natural and sound state, are cold, moist, and watery bodies, therefore heat and dryness are directly opposite to their nature; and altho' dryness must in consequence succeed heat, (unless the heated body be constantly supplied with fresh moisture) yet we must consider how heat alone acts in Potatoes, and how when joined with moisture.

4. Heat alone in Potatoes rarifies their juices, and causes the more fine, subtile, and volatile parts thereof to evaporate, leaving them in a flacid and languid condition. Again, Heat when joined with moisture likewise causes a loss of some of the more subtile and volatile particles of the vegetative spirits, and a fresh supply of a more cold and watery substitute. Hence they appear plump and solid; but for want of their volatile vegetative spirits, their whole nature is greatly impaired, and rendered unable to perform their work of vegetation to perfection.

5. When I speak of heat alone, I mean only that degree thereof which they receive by being kept in a warm, dry room, &c. When of heat joined with moisture, I mean

mean that degree which they receive by being kept in a pye or hole in the ground, without any intermixture of earth, which causes a heat and fermentation of their juices. See PART III. SECT. III.

6. From an observation of these marks and effects we may understand that the disorder in Potatoes (in this case) proceeds from their being exhausted or drained of their radical moisture, which renders them languid and emaciated, so that their vegetative property is so impaired that it cannot perform its work of vegetation to perfection. The marks and effects of the disorder in the tops or stems of Potatoes, while growing, are so conspicuous to those who have them under their inspection, that I need not say any more upon this head.

S E C T I O N II.

1. When the disorder is caused by frost, bruises, &c. the Potatoes feel softer to the touch than they do when in a sound state : if they are cut with a knife, they appear watery and flabby, with a very disagreeable smell, and other marks of the continuity of their parts being impaired or broken. When they are made ready for eating, (especially by boiling) and their skins taken off, they are covered with a kind of mucus, or moist, clammy matter; when cut, they appear variegated with a lighter and darker colour, the texture of their whole body seeming to be in a state of dissolution, entirely wanting that compact, dry, and mealy property which they have when in a state of perfection. The smell of them are earthly and disagreeable, tending to that of a vegetable putrefaction. Their taste is cold and watery,

with a disagreeable flavour, much like that of some acrimonious metallic substance.

2. If the frost be only weak, it does but lightly disorder the youngest and tenderest leaves, causing them to become flabby, and of a deadish colour, which generally are restored again to their pristine state when the frost breaks up, only perhaps some of the tenderest leaves may remain a little withered and crispy at their extremities. But when the frost is strong, it contaminates the whole plant, causing both leaves and stems to appear entirely flabby, blackish, and in a state of dissolution, soon becoming putrified, and rotting upon the ground.

3. The next thing to be considered is, how frost acts upon Potatoes, so as to vitiate their vegetative property.

4. It is to be observed that in inanimate, as well as animate bodies, any thing that impairs or breaks the continuity of their parts prevents them from performing their natural functions, and causes a depraved state of the solids and fluids, which occasions the body to become impaired or abolished: hence a disorder. It is the very nature of frost to impair or break the continuity of the parts in cold and watery bodies, (such as Potatoes are) for a lesser degree thereof divides the particles of the fluids, and the more saline and nitrous parts become coagulated and separated from the watery parts.

5. A greater degree of frost wholly fixes the fluids, rendering them entirely unfit for circulation, forming them into sharp spiculas, which wound and divide the solids so as to bring on a mortification in a lesser or greater degree, according to the strength of frost, as may

may be seen when the frost breaks up; at which time the whole plants often become a heap of putrefaction.

6. The more suddenly the frost breaks up, it is so much the worse, for Nature cannot so well dispense with sudden changes as with those that act more slowly. Although the slower the frost breaks up, by so much more the continuity of the parts is restored, yet it can never more be compleated, for the more watery parts of the fluids will first be dissolved, and begin to circulate before the saline and nitrous parts are dissolved; therefore as there can never more be a perfect continuity of the parts, there must in consequence for ever remain, in some degree, a disorder, which becomes hereditary; and if the vegetative property in Potatoes becomes thus vitiated, it cannot be again restored to its pristine state: for should it be in a lesser degree, yet the infection is in the same degree communicated to both the fresh roots and seeds, (although, as I observed before, no imperfect plants produce any perfect seeds, yet they often discover such as are imperfect) which may be produced from the old vitiated and degenerate stock, even after numberless successions. The effects of bruises, See PART III. SECT. II.

7. The common or general marks and effects of the disorder in Potatoes, while growing, are, as already hinted, sufficiently conspicuous, and need no description, but the irregular manner in which they frequently are dispersed is at this time worthy of notice. Sometimes whole rows of them, even a great number together, are disordered; sometimes only one row here and there, or only half a row, and that in some particular place or places; or one of the ends of several rows only;

only; and sometimes the middle part of the rows are only disordered, &c.

8. Sometimes there are only a few single plants here and there dispersed over the whole piece of ground where they grow that are disordered; sometimes they are all or most of them disordered; and at other times but very few or none. In short, instances of these kinds are almost innumerable; for it often happens that one and the same Potatoe being divided into two sets, and even placed besides each other, the one will produce a perfect plant, and the other an imperfect one: and sometimes one set will produce five or six stems, four or five thereof free from the disorder, the other not. I have observed one stem produce two branches, the one of which was disordered, the other not: this seldom or never happens but in luxuriant plants, where Nature is too profuse, which causes another branch to spring from the first or main stem, which having a greater power of attraction than the other, it flourishes and robs the other of its nourishment, and so it becomes disordered; or it may be caused by some wound or hurt upon the same side of the main stem. I have likewise observed a single eye-hole produce two stems; one of which was disordered, the other not. This strange phenomenon, and the cause thereof, seems to be very abstruse; but what I have learned by experience I am willing to communicate; and I have frequently observed, that where this phenomenon happened, if the plant was taken up and examined, it always appeared to be detrimented or hurt by being cut, bruised, or wounded very near the eye-hole, on that side where the disordered stem takes its rise, which deprives or impoverishes it of its due quantity of nourishment,

ment, whereby it is rendered weak, languid, and unable to produce a sound and perfect stem. Perhaps this account may appear hypothetical, but it ought to be considered that each eye-hole of the Potatoës is supplied with juices circulating in distinct vessels and capillary fibres from different parts thereof; and when the Potatoe is cut or wounded too near the eye-hole, the vessels and fibres which bring nourishment thereto are the greatest part of them taken away; in consequence of which it must be rendered weak and languid, as not having a sufficient supply of juices.

9. To corroborate this theory, we need only cut away the roots from one side of a vigorous and luxuriant tree, and the same side will become less vigorous and luxuriant than the other, in proportion as the root is more or less cut. The same will hold good, in some degree, if the bark be detrimented, or taken off from one side of the main stem or trunk of a tree. These, and the like experiments, are sufficient to prove that this theory is not wholly chimerical, but founded upon some degree of truth. The marks and effects of bruises I shall consider in PART III. SECT. II.

10. Some general remarks upon Curl'd-Topt Potatoës.—It is observable that all substances, both animate and inanimate, have by Nature a tendency to propagate their own species. Such as are in a languid, weak, or declining state, do sooner become more prolific than those which are sound, and in a state of perfection; yet their offspring is never so perfect as that of the other, the one having less time than the other in which it must either propagate its species, or else be extinct for ever; therefore are more apt to become fruitful sooner than those

those which are more luxuriant and profuse in other respects.

11. An instance of this remark we have in Curl'd Topt Potatoes: for if they are taken up early, (as suppose about Midsummer) their young offspring will at that time be both more in number and larger in size than those of the more luxuriant and vigorous plants: but the former being in a weak declining state, not having strength enough to carry on the work a sufficient time to compleat a perfect maturation, it is of necessity cut short, and only an imperfect species produced: the latter being vigorous and strong, carry on their work a sufficient time, and in the end produce their species in the greatest perfection both as to number and size.

12. It is almost a general rule, that the longer time Nature is in perfecting her work, so much more perfect it will be in the end; but it is observable, that the stems of Curl'd Topt Potatoes cease growing, and die long before those in a state of perfection.

13. To obviate these remarks, let us, for instance, suppose a tree to be very flourishing in its branches, yet never bear any fruit. If it be taken up by the root at a proper time, and planted again upon the same piece of ground, it will become prolific; and it is somewhat similar if the tree be impaired or weakened in any other respects: but it is frequently reverse in those that are already profuse in bearing fruit; for if they are removed or impaired in any degree, they become for several years less fruitful than before, or, if not properly managed, perhaps entirely barren.

14. Again,

14. Again, Let us suppose two trees of one kind, and each of them sound and vigorous, with branches, leaves, and fruit upon them alike; yet if either of them are impaired or hurt in any respect, the produce of one will arrive at perfection sooner than the other, but not in so great a degree as the other will afterwards attain to. Perhaps I have been too prolix in these remarks, (seeing they are already understood by the Gardener, and such as make this part of Nature their study) but I did it to instruct and convince those who are less conversant in these matters; therefore hope the digression will not be altogether unserviceable.

P A R T III.

Of the various causes of the disorder; and the errors which are frequently committed in the common management of Potatoes.

And these I shall divide into Five Sections, in the following order, viz. 1. The time of their growth. 2. Taking them up. 3. Putting them into the pye or hole in the earth, in order to preserve them from the coldness of the winter, &c. 4. Taking them out of the pye. 5. Setting them.

S E C T I O N I.

1. During the growth of Potatoes, if any of their tops or stems are destroyed either by frost or any accident, fresh ones will arise from the emaciated and almost exhausted roots or sets, in a few days after, though they grow but very slowly, and appear of a degenerate or Curl'd Topt kind. To prove this, you need only break off the stems of some vigorous plants of Potatoes as

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they are growing, without disturbing the roots, and they will produce fresh tops, as I have before noticed; for the roots being already greatly exhausted by the first tops or stems which were broken off, they can produce only such as are imperfect.

2. The frost first disorders those Potatoes whose tops are the highest and most flourishing, while those that have not been so forward in their growth, missing the frost, their tops will appear tolerably well, unless they are such as have been much disordered before they were set, in which case they will always come short of those in a sound and perfect state. It is therefore an error to break or cut off the tops or stems of Potatoes while growing, or to suffer them to be bruised by treading upon them, or the like; for if their stems are cut off while they are young and flourishing, (before the Potatoes are formed, or but very small) they will scarcely produce any at all, and those of no use.

3. The reasons why the stems of some Potatoes appear above the earth's surface sooner than others, are now to be considered; for this is one of the chief causes of the irregular manner in which they frequently appear, especially when disordered by frost.

4. If Potatoes were all of one kind, in the same degree of soundness, set in an open piece of ground, of the same quality, depth of soil, &c. all of them set to the same depth therein, with their root ends downward, and manured to the same degree and form with the same manure, &c. they would all or most of them make an equal progress, appear above the earth's surface at one time, (unless hurt by some accident) and all

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of them be alike affected with the frost, or none of them.

5. But as these circumstances are very seldom or never the case, the contrary effects must be expected. Potatoes are but seldom of an equal degree of soundness, and all of one kind, which makes a great difference in the manner of their growing, because some are of a more early kind, and will vegetate sooner than others, and therefore their appearance above the earth becomes irregular, &c.

6. As to the earth, especially a large piece, it is very seldom all of the same quality and depth of soil, but frequently very different in several respects, even in a very little distance or space; and though there are no visible marks, yet the cause may be from the effluvia or volatile particles arising from different subterraneous mineral substances, springs, &c. within the bowels of the earth, or not far from its surface. These and the like circumstances, or any of them, are sufficient to alter the vegetative property of the earth. This is often the cause of the ends and middle parts of several rows together appearing disordered, and sometimes several whole rows together, &c.

7. Potatoes being set of different depths in the earth, in different positions, and nourished with more or less quantities of manure of different qualities and degrees of richness, will also make some difference in the time of their coming up; for manure made of different substances, and by different processes, is of very contrary natures, and produces different effects; and though the manure is all taken from the same heap, yet there may

be a difference therein, especially when it is made of very different substances, or is not equally rotten. There is likewise a great difference in manure that is taken from the top and bottom of the heap, even though all of the same substance. The various qualities and degrees of the richness of manures have variety of effects on the vegetation of plants.

8. Manure being put to Potatoes in various forms, will also have different effects; for sometimes it wholly covers, at other times it only lays besides them, and frequently earth falls upon them before they receive any manure: these and such-like circumstances occasion some of the Potatoes to appear sooner than others.

9. Potatoes being set of different depths in the earth, and in different positions, will cause some alteration in the time of their coming up; for if the bottoms of the several holes are level with each other, and the Potatoes (especially if of a long kind) set in them, some with their sprouting ends upwards, and others laid lengthways, the tops or sprouting ends of some will be nearer the earth's surface than others, which in some degree acts as if they had been set of different depths.

10. In all these circumstances it is to be observed that the Potatoes are supposed to be all of one kind, and perfectly sound; therefore though they appear above the earth's surface one before another, and differ in their progress, yet none of them will have Curl'd Tops, unless they become vitiated by frost, or some accident, which will act upon them in various degrees, accordingly as they are more or less advanced in growth.

11. There

11. There are other causes why some Potatoes come up sooner, and make a better progress than others; as when some of them are kept much dryer, thrown about, bruised, &c. more than others. If you take Potatoes that are all of one kind, and equally sound, and keep one half of them in the earth, (as I shall direct in PART IV. SECT. III.) and the other half in a dry room, so as the frost does not hurt them, until setting time, then you will find those that are kept according to my directions will be very different in several respects from those that are kept in the room; for the former will be plump and fresh, having all the marks of perfection, both as to sight, smell, and taste; but the latter will be flacid, soft, light, and languid, having all the marks of imperfection. From these observations it is evident that the vegetative property is much stronger and more active in one than the other, and will have different effects, as may be seen if you set them both at one time in the same piece of ground; for if they be kept too long in a dry warm place, and are much bruised by removing from place to place, they will scarcely grow at all; which, if they do, they will only (at the best) produce very imperfect plants of the Curl'd Topt kind.

12. Such circumstances as I have now mentioned cause Potatoes to be weak and disordered, which occasion them to come up more slowly than others, and therefore escape the frost; while those that are more sound, having already appeared above the earth, become disordered, in which case the whole crop is depraved; for those that are not come up, and have escaped the frost, yet being disordered before they were set,

set, it cannot reasonably be expected that they will produce sound plants.

S E C T I O N II.

Of taking Potatoes up.

1. At the time of taking Potatoes up, no regard is paid either to the kind or property of them, but all that are of an agreeable size for sale or using are thrown into one promiscuous heap, both good, bad, and indifferent, whole Potatoes, halves, pieces, those that have been bruised, and even those that have been taken from the roots of such as were Curl'd Topt; which last circumstance must prove an infallible method of raising Curl'd Topt Potatoes.

2. There is another error which is commonly committed in the management of Potatoes, viz. Throwing them, or letting them fall with too great a force one upon another, or upon any thing that is hard. This error ought always to be guarded against as much as possible; for as they are solid, heavy bodies, and only of a soft texture, they receive hurt by bruises sooner than is commonly imagined; the velocity they acquire by falling two or three feet perpendicular upon any thing that is hard, is sufficient to detriment them in this respect. What then must be the consequence of carelessly throwing them the distance of several yards upon one another, or upon whatever they come in contact with? This I shall leave to the consideration of every reasonable person.

3. Bruises

3. Bruises have very bad effects upon Potatoes, for they not only break the continuity of the parts where they happen, but cause the extravasated juices therein to stagnate and become fixed, and often bring on a violent mortification. If the contusion be superficial, and almost inconsiderable, yet it will contaminate as far as it extends; and though a single slight contusion cannot do much hurt, yet a number thereof would. In short, if a Potatoe were but slightly bruised in every part of its surface, its vegetative property would be wholly destroyed. The effects of a violent contusion are obvious, and need no illustration.—Another error is taking them up in frosty weather.

SECTION III.

Of putting Potatoes into the Pye.

1. At this time there are several errors committed. There is a deep hole made in the earth, (or one as deep as the place will permit) into which the Potatoes are promiscuously thrown, both sound, unsound, and of different kinds, without any earth being intermixed therewith, heaping them above the earth's surface, and covering them with straw and a little earth over it.

2. These errors are attended with very bad consequences, and are some of the grand causes of the Curl'd-Topt Disorder; for thereby the Potatoes are kept too warm, which causes them to vegetate sooner than could be wished, as by this method most of them will begin to vegetate before Christmas, and several of them at that time will have long sprouts upon them, whereby they become too much exhausted of their vegetative property
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before setting-time ; and if they do not appear in an exhausted state, but remain hard and solid, yet the same marks are found even in the old sets that are taken up about Midsummer, or before they begin to decay or rot ; for though these old sets are entirely exhausted of their vegetative property, yet, (as I hinted in PART II. and SECT. I.) they are supplied with an additional moisture from the earth.

3. Potatoes being thus drained of a great part of their volatile spirits, are rendered weak and languid, causing them to become mouldy and of a disagreeable smell ; and often many of the tenderest kinds, and such as have been weakened by bruises and such-like accidents, are wholly corrupted and turned to putrefaction.

4. The air that is contained in the interstices or vacant places between the Potatoes, stagnates and loses the spring of vivifying spirit or quality, and becomes very detrimental to their vegetative property, and frequently wholly destroys it. These and similar effects of stagnated air, are well known to those who understand the nature of fermentations, and the effects of foul air arising therefrom. If any straw or such-like substance is intermixed with the Potatoes, or laid upon them, (as it is commonly practised) it is so much the worse ; for such things greatly assist in bringing on the intestine heat, fermentation, and generation of foul air, as all bodies do which are in a state of putrefaction.

5. By keeping Potatoes in pyes, they become hottest in frosty weather, which entirely prevents them from being impregnated with the nitrous particles in the air, which abounds at such times, for the intestine heat of the earth

is always greatest in frosty weather, because the frost binds or stops up the pores thereof, and prevents it from perspiring : hence the internal heat becomes greater than the external ; and heat is so very contrary to the nature of nitre that it entirely prevents its generation, and even exhausts the earth of that nitre it already contains. Nitre, in its natural state, is very volatile ; but when it comes in contact with any fixed alkaline salts, it easily incorporates therewith, and becomes a kind of neutral salt, as partaking both of an acid and alkalous nature, and is thereby rendered less volatile. The method of keeping Potatoes in rooms is likewise equally detrimental and has nearly the like effects as those which have been mentioned. See PART I. SECT I.

SECTION IV.

Of taking Potatoes out of the Pye.

1. At this time, those potatoes that are wholly corrupted, are thrown away ; those that are affected in a less degree have the corrupted part cut off, the other part, (supposed to be sound) saved : but although this reserved part is not in any visible state of putrefaction, yet it is greatly contaminated, or rendered impure.

2. Such Potatoes as are slightly disordered, and are only become a little soft and watry, the worst of them are either thrown away, or given to the swine, and the others kept ; so that a promiscuous heap of those that are sound and disordered is reserved, and the owner cannot separate them again : but, however, when the time of setting is come, he does his endeavour ; for when he finds any that are a little softer than he could

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wish, and knowing that they will not be good to eat, he says they will make very good sets: and those that he finds decayed in any part, he likewise knows that they are neither fit for sale, nor the best for his own eating; therefore when he has cut off the decayed part, he throws the other among the sets. These are some of the most effectual methods of producing Curl'd-Top Potatoes.

3. But here some may object, and say that they take an entire different method in choosing their sets; for they set none but such as are sound, free from frost, are very hard and solid, that they were taken from the bottom of the pye, &c. But to choose those that are sound from among such as are in a reverse state, is so very difficult, that it is next to an impossibility; because some of them may be disordered in so small a degree as to leave no visible marks, (though inspected by a careful eye) and accordingly will infect their offspring throughout numberless successions. As to their being taken from the bottom of the pye, &c. it is no reason why they may not be disordered even by frost, for they may have received the disorder before they were put into it, or even before they were taken up, or in the time of their growth, and yet have no visible marks.—Of Potatoes being cut for sets, see the error in the 6th Remark in the Introduction.

S E C T I O N V.

Of setting Potatoes.

1. At the time of the year when Potatoes are commonly set, there is often frosty weather, which disorders them before they are covered with earth; for it is customary to take as many of them into the field, in the morning,

morning, as are intended to be set the same day, where they lay until the holes, &c. are made ready, and very often they remain in the holes uncovered till almost night, in which time the frost frequently disorders many of them, when but little suspected.

2. At this time likewise Potatoes are usually cut into pieces for sets; and some people have been so fond of this unnatural method, that they only cut out a single eye-hole here and there, and set them: others, yet more curious, pare the Potatoes, and cut the parings into as many sets as there are eye-holes in them. These Secrete-mongers carry their nice art of cutting rather too far. It is true they save some of the best part of the Potatoes, which serve their swine to eat, but thereby entirely lose or spoil their expected crop.—See more of this in the Introduction, Remark 6th.

P A R T IV.

Of the Cure of the Curl'd Top disorder of Potatoes.

And this I shall likewise divide into Five Sections, in the following order, viz. 1. The time of their growth. 2. Taking them up. 3. Putting them into the Pye. 4. Taking them out of the Pye. 5. Setting them.

S E C T I O N I.

1. In the time of the growth of Potatoes, when they are expected to appear first above the earth's surface, (which will be about twenty-five or thirty days from the time of their being set) and may be perceived by their raising it up, if at this juncture it happen to be frosty

weather, they must be lightly covered with a little earth, to prevent it from hurting them; and when they are all come up about six inches, they must be banked as usual, kept clean from weeds, and care taken that nothing injure or wound their stems. When any weakly or disordered plants appear, they must be taken up. They may be known by their stems being short and small, their leaves little and of a pale colour, &c. or if the frost has already hurt any of them, so that they appear a little Curl'd, they must also be taken up.

2. If the Potatoes are of various kinds, they must be separated; and whenever they appear of different sorts, (which may be known by the difference in colour and form of the flowers and leaves, and from the aspect of the whole plant) they must be marked, that they may be known when they are taken up. Potatoes that are intended for sets should never be of different kinds mixed together.—See the reasons given in PART III. SECT. I.

3. If the Potatoes are suffered to remain in the ground after their stems begin to decay and are dead, and the weather begins to be frosty, the decayed stalks must be taken away from them, and the holes which they leave filled up or covered with earth, otherwise the cold frosty air will gain an entrance, and disorder some of the uppermost Potatoes. A stiffish broom may be used to fill up the holes: but if the Potatoes are designed to remain untaken up for some time, they should be secured as I shall direct in SECT. III.

SECTION

S E C T I O N II.

Of taking Potatoes up.

1. Potatoes that are intended for sets must not be taken up until their stems are entirely dead; and frosty weather must be avoided as much as possible at this time; therefore they should not be taken up too soon in the morning, nor too late in the evening, (especially when the weather is inclinable to frost) neither must they be suffered to remain too long upon the ground, but put into a room to be preserved until as many of them are taken up as are intended to be put into a pye or bed, as I shall direct in the next SECTION.

2. The Potatoes must not remain in the room above a week or ten days at the most; neither must they be laid too many one upon another, for then their own weight would be sufficient to bruise and do them hurt; besides it would cause too great a heat, which would very much contaminate them. If any parts of the Potatoes are bruised or hurt in the time of taking them up, they should be cut off with a sharp knife; and great care must be taken not to throw them with too great a force one upon another, or upon any thing that is hard.—See the effects of bruises in PART III. SECT. II.

S E C T I O N III.

Of putting Potatoes into the Pye or Bed, &c.

1. This must also be done when the weather is dry and free from frost, and those Potatoes that seem to be
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detrimented must be kept out, lest they should corrupt and tend to contaminate the rest. They must be put in very gently, and the hole not filled with them above six inches high, and then about other six inches high with fine loose earth, treading it gently down. This method of laying the Potatoes and earth *stratum super stratum*, or layer upon layer, may be continued until the Potatoes are within six inches of the surface; then the hole is to be filled up with earth, which must be made tolerably solid by treading it down; then a covering of earth must be raised over the hole, the basis of which (just above the earth's surface) must be about two feet more in diameter than the top of the hole, and must be raised in its centre to make its apex a little convex.

2. This method of preserving Potatoes in pyes will do very well where they are intended for common use; but those that are for sets should not be put so deep into the earth, nor laid so many one upon another. Therefore the best method of preserving them is by putting them into (what I call) a bed; which is thus done: First make a hole in the earth, as wide as you think proper, one foot and a half deep, let it be level at the bottom, and put as many Potatoes therein as will cover the same, without laying one upon another; then cover them with fine earth, (if sand can be got, it is better than earth in several respects) about three inches high above them; (it should be made to go in between the Potatoes, so as to fill up the vacant places; this may be done by putting but a little earth upon them at one time, and stirring it about with a stiffish broom, or some such thing) then lay more Potatoes as before, and cover them again with earth other three inches high; then lay more Potatoes, and fill up the hole or bed with earth, treading it down
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and covering it about nine inches thick above the earth's surface. In very frosty weather, a little straw or some such thing should be put upon the top of the pye and bed, but removed when the frost is over.

3. There is yet another method of preserving Potatoes for sets, which is preferable to those I have mentioned. I mean their not being taken up, but suffered to remain where they grew, until they are wanted, which may be thus done: First take up every other row, and trim up those that remain (as I directed in SECT. I. of this PART); then bank them up with earth taken from between the rows. In very frosty weather they should be covered with a little straw, or some such substance, and if removed when the frost is over, so much the better, for it should be observed as a maxim, that Potatoes cannot be kept too cold, so as they are secured from the frost.

4. By these methods of preserving Potatoes cool, they are kept from vegetating or sprouting until a proper time of setting them; whereas by the common method they vegetate or sprout too soon, and become too much exhausted before that time.—See the effects of keeping them warm in PART III. SECT. III.

5. Both reason and experience confirm these remarks; for you need only observe those Potatoes which (by an oversight in the time of taking up) were left until setting time, and you will find that they are scarcely beginning to vegetate, while those that have been kept warmer will have long sprouts upon them; and it is a certain truth that they will vegetate either sooner or later, according to the degree of warmth or coldness.

to which they are exposed; but they ought to be kept from sprouting as much as possible until setting time.

Note. If any Potatoes are preserved in a room, there should be some fine earth or sand mixed with them.

SECTION IV.

Of taking Potatoes out of the Pye.

1. This must also be done when the weather is free from frost; and there must be a hole made in the earth, close by the side of the pye or bed, sufficiently wide for a person to go into to take out the Potatoes, which hole must be made deeper as there is occasion. This method will prevent them from being bruised by treading upon them, &c.

2. If all the Potatoes are not taken out of the pye or bed at one time, the hole at which they are taken out must be well secured from the external air. Potatoes must not be taken out of the pye or bed too long before they are intended to be set; a few days (especially if they are kept too dry, removed from place to place, exposed to frost, &c.) are sufficient to lay a foundation for the disorder.

SECTION V.

Of setting Potatoes.

1. Potatoes should not be set too soon, for that may expose them too much to frost during the time of setting, which very often happens at that season of the year;

year; yet when they cannot (by the methods I have laid down) be prevented any longer from sprouting, they must then be set; therefore about the beginning of April the pye or bed must be opened to examine them; and if they are beginning to vegetate, they must be set, otherwise they will be detrimented; but if there be not much appearance thereof, they may be kept in the pye or bed a little longer.

2. Potatoes had better be set soon than late; for tho' when too forward in their growth they are exposed to the frost, yet their being set early will not make them vegetate sooner than those which are set afterwards; for by being set they are cooler than those in the pye or bed, and will thereby be kept from vegetating until the season of the year and natural heat of the earth causes them, as may be seen in those Potatoes which I mention in SECT. III. of this PART. For although they were left in the earth all winter, yet they did not vegetate so soon as those which were set in the Spring by the common method: the reason may be easily understood from what I have already said.

3. Potatoes that are intended for sets must be perfectly sound and in full maturity: in this respect as much care and exactness is required as is chiefly observed in choosing grain which is intended for seed. Potatoes, therefore, while growing, must be carefully inspected, and those plants which appear any way disordered or weak must be either taken up or marked, that they may be known when their stems are dead, for they must be kept apart from the others.

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4. Potatoes that are intended for sets should likewise be the largest that are taken from the roots, (which can only be done at the time when they are taken therefrom) and this is absolutely necessary; because the largest are in their perfect state of maturity, the others only in a state of ripening. This may be proved by taking up a root of Potatoes while they are young, (suppose about Midsummer) and perhaps there may be four, five, or six Potatoes of a tolerably good size, (considering their age) with others that are very small, some only just forming into Potatoes, at the time when the stems are dead; yet they will appear at that time as old as the others, though in fact they are not, and will fall short of their perfection in several respects; therefore they ought to be rejected for sets, notwithstanding they are of a tolerable size, and the largest taken from other roots, though less than those which were rejected: they should likewise be all of one kind.

5. Potatoes are frequently set too close together, both as to sets and rows, and are not a sufficient depth within the earth. They should be set about six inches below the surface; the rows three feet and a half, or four feet distant; the sets one foot and a half, or two feet from each other, and all of them with their sprout-ends upwards.

6. It is a very great error to set Potatoes too close together, and where it is practised there will never be any Potatoes grown to so great perfection as otherwise they might; for when Potatoes are in a healthy and sound state, and kept clear of weeds, (which they always should) their stems are very luxuriant, and will extend much further than is commonly imagined. How
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can it then be reasonably expected that they will grow to perfection where they are crammed into so little room that their stems are entangled one with another so as to deprive the earth of the light and heat of the sun and air, which are so essentially necessary in the vegetation of plants? Besides there are frequently more planted than the earth can support in any degree of perfection. It frequently happens where a sound and healthful plant is found among a number of those that are Curl'd-Top'd, that it flourishes, becomes very luxuriant, and at last produces an uncommonly good crop. Potatoes must not be planted above eight or ten years at the most after being raised from seed; therefore at that time some seedling Potatoes, (raised from sound and perfect seed) about two or three years old, must supply the place of old sets.

P A R T V.

Of collecting and preserving Potatoe Fruit or Apples, for obtaining their seed, and how to raise Potatoes therefrom.

1. The apples must be the largest, taken from such plants as are intended for sets. But as the apples must not be taken until the stems of the Potatoes are entirely dead, it often happens that there is frosty weather before this time, which vitiates them: therefore as soon as frost is expected, (which may be about the middle of October) the stems which have the apples upon them must be carefully bended down, and covered lightly with fine earth, until they are entirely dead, when the apples must be taken from the plants, and put into a box, or some such thing, in the following manner: First fill

the box with fine earth, (making it tolerably solid by pressing it down) four inches high, and lay as many thereon as can be done without placing them one upon another; then fill the box about four inches more with earth, and put the apples therein as before; and thus continue to lay the earth and apples *stratum super stratum* until the box is filled, beginning and ending with earth or sand. When the box is thus filled, it must be buried in the earth, to secure it from the frost, where it must remain till about the beginning of April, at which time the box must be taken up, and the earth and seeds well mixed together, and sown upon a bed of fine earth, and covered about three inches thick with the same.

2. To know how deep the seeds are covered, several pieces of sticks may be put with one of their ends into the bed, in several parts thereof, and the other end about three inches above its surface. When the seeds are thus sown and covered with earth, if the weather be frosty, especially in the night-time, the bed must be covered with a piece of sail-cloth, painted cloth, or some such thing; but it must be taken off in the day-time, when the weather is not frosty.

3. When the young plants begin to come above the earth, the covering must be raised a little from the surface of the bed by some stakes, to prevent it from pressing upon them; but the edges of the covering should hang down so as to reach the earth, to prevent the frost air from getting under it. In very wet weather one side of the covering must be raised a little higher than the other, to cast off the water from the bed.

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4. The plants must be thinned several times, and only some of the strongest left, about nine inches one from the other; they must not be taken up until their stems are entirely dead; and as there is frequently frosty weather before that time, they must be preserved therefrom by throwing a little more earth among them, and covering them as I have directed; they must be treated in all other respects as other Potatoes intended for sets.

5. They will be fit for sets the second or third year after they are sown. Be sure to make choice of the largest, always rejecting the smallest for reasons given in PART IV. SECT. V.

Note. In raising Potatoes from seed, they are frequently of different kinds, but they may be known by the shape of the leaf, colour of flowers, and the whole aspect of the plants. As they will differ from each other in several respects, some being of a more hardy nature, and some vegetating sooner, they ought to be carefully separated.—See the reasons given in PART III.

SECT. I. PART A R T VI.

Some reasons why Potatoes in England are in a more degenerate state (especially by being Curl'd Topt) in these later years than before.

1. When Potatoes were first brought into England, they were of more value, and a much greater regard paid to them in every respect more than now; but when they became more plentiful, and people perceived that they were (as they say) an hardy root, and would grow

as long as they had any moisture left in them; then it was soon concluded that nothing but violent frost, making them ready for eating, &c. would kill them, so long as the least part of them remained; therefore they might use them as ill as they would, only get them into the earth before they are entirely destroyed, and then they would be sure to grow and do well.

2. Thus people, unskilled in the cultivation of the earth, and the vegetation of plants, &c. began with many strange and erroneous methods of setting Potatoes of all kinds, whether sound or unsound, just as they came to hand, and thought no more about it, until they found their succeeding crops were not according to their expectation, and then they said that the Potatoes were in a state of natural degeneration, instead of truly saying the fault was in themselves.

3. Thus strange and improper methods of setting Potatoes, and the unnatural usage which they met with from people in general, became so common, and almost universal in practice, that even the more experienced gardeners, people skilled in plants, &c. were mislead, and in many respects committed the same errors. Examples of these kinds are very deceiving, and in process of time often prove of bad consequence; for any thing that makes but a slow progress is more deceiving than that which acts with greater speed.

4. Perhaps all the wrong methods of cultivating Potatoes, that could be thought of, have been put into practice by one person or another; and at present, instead of following any reasonable method of setting them, they are scarcely set at all: for some people only put them

them upon the earth, and lay a sod (with the grass side downwards) on them; others throw them at random upon the ground, and just cover them with a little earth; others only make a hole in the ground with a blunt-ended stick, just large enough to hold the Potatoo, &c. and as such-like erroneous methods did not immediately produce any apparent bad effects, they were practised by many who, it seems, did not consider what would be the event in process of time.

5. If this disorder of Potatoes had not made so great a progress as it has of late, I know not whether some of these curious people would not have expected them to grow by being only thrown upon the ground, and harrowed in with harrows, for they seem to be imitating something of this kind; I mean their being set with the plow: for the greatest number of Potatoes in this country at the present are both set, banked, and taken up without either spade, hoe, or any other proper instrument for these purposes, and that without much trouble and expence, which two last circumstances seem only to be regarded; so in this respect the cultivation of Potatoes are brought to very great perfection. But what is the event? The crop is bad, and greatly detrimented in several respects, which lays a foundation for the present disorder, and will in time bring on the highest degree thereof.

6. As this erroneous method of cultivating Potatoes is at present much in practice, I shall give a short account thereof, and likewise of some of the consequences and effects which attend it.—First, a furrow is made with the plow, which is much too shallow for the present purpose, and the Potatoes thrown into it, manured in a careless

careless manner, and then covered with earth by the plow; in so doing a great number of them are detri-
mented by the feet of the cattle, &c. and some of them,
instead of being covered, are raised almost out of the
earth, and others pressed deeper in by the cattle tread-
ing upon them; with numberless other errors committed
therein.

7. As to banking and taking Potatoes up with the
plow, every thinking person may easily perceive the
consequences of such management. In short, the me-
thod is entirely unreasonable and erroneous, and per-
haps it took its rise from slothfulness and covetousness.
Thus any art or science that seems to be easy of per-
formance is frequently abused by pretenders, while those
that are more abstruse are improved by such persons as
have proper conceptions.

8. Another grand cause of this disorder of Potatoes
making a greater progress in these later years than before
is, their being cultivated too long a time without being
raised afresh from sound and perfect seed.—See PART V.

9. It is remarkable that this disorder of Potatoes be-
gun first in the Southern parts of England, and is not
yet much known in the Northern parts, (especially in
those places that are near the sea) and in the farthest
parts of Scotland there is no such thing at present, but
in process of time would become disordered there also,
if a proper method were not taken to prevent it; the
reason of which is, that heat (as I observed in PART III.
SECT. III.) is an enemy to the nature and production
of nitre; and as heat abounds more in the South than
North,

North, Potatoes are sooner deprived of their nitre in one quarter than the other.

10. For these reasons, Potatoes sooner become disordered in low, close places, where the earth is of a warm, moorish, or sandy nature, than they do in high, champaign places, where the earth is more cold and strong, &c. I am certain that Potatoes, when in a state of perfection, do abound with nitre, (see the Preface) and when they are deprived thereof they become weak and languid, which lays a foundation for the disorder: yet, in this case, I know by experience that they may, in a great measure, be restored to their pristine state by a composition of nitre, alkaline salts, &c. if properly applied. But as it would not wholly answer the desired end, without adhering to the directions already laid down, it might prove a means of neglect, and therefore I shall say no more concerning it at present.

As to raising Curl'd-Topt Potatoes, it is very easy, only persevere in the practice of the errors which I have mentioned, and the work is done, especially if the Potatoes are rendered much exhausted and emaciated before they are set: or, if they are exposed to a light degree of frost, until they are become a little soft thereby, this will not wholly destroy their vegetative property, but so contaminate it that you may have no doubt of their not producing Curl'd-Topt Potatoes, unless the experiment be carried so far as to wholly destroy their vegetative property.

F I N I S.

North Potatoes are sooner deprived of their sile in one quarter than the other.

10. For these reasons, Potatoes sooner become diseased in low, close places, where the earth is of a warm, moist, or sandy nature, than they do in high, airy places, where the earth is more cold and dry, &c. I am certain that Potatoes, when in a state of perfection, do abound with sile, (see the Preface) and when they are deprived thereof they become weak and languid, which lays a foundation for the disorder: yet, in this case, I know by experience that they may, in a great measure, be restored to their genuine state by a combination of sile, &c. &c. in properly applied. But as it would not wholly answer the desired end, without adhering to directions already laid down, it might prove a needless neglect, and therefore I shall say no more concerning it.



As to raising Carib-Top Potatoes, it is very easy, only persevere in the practice of the cure which I have mentioned, and the work is done, especially if the Potatoes are tendered much expanded and emended before they are set: or, if they are exposed to a high degree of heat, until they are become a little soft thereby, this will not wholly destroy their vegetative property, but so contrivance it that you may have no doubt of their not producing Carib-Top Potatoes, unless the experiment be carried far as to wholly destroy their vegetative property.

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I N D E X

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AN APPENDIX

CONCERNING THE ARTIFICIAL MANURE

FOR POTATOES.

AS this ARTIFICIAL MANURE is a New Invention, and has not as yet been in the hands of many persons, perhaps it would be a difficult task to convince the public in general of its utility, until future experience confirm it; but I can assure them from repeated experiments that it has surprising effects upon Potatoes; for it not only prevents them from being Curl'd Topt, but improves and restores them to great perfection.

It is certain (as I hinted in my *Treatise on the Management of Potatoes*) that the earth, in its natural state, contains various kinds of salts, sulphurs, bituminous substances, &c. and that each kind of plants, when in a state of perfection, do likewise contain more or less of each of these substances, &c. But some kinds of plants are more replete, or do contain more of one kind than another, which they naturally attract for their nourishment; therefore different kinds of plants require different kinds of substances to nourish and support them in any degree of perfection. To this end I have adapted the Artificial Manure to the nature of Potatoes, so that in these respects it will be found to supply the defects of Nature, as being a proper succedaneum in the stead of that which is wanting.

To show the utility of the Artificial Manure, I shall only give an instance of one experiment, viz. About the

the 10th of July last, I took up a plant of a rank Curl'd Potatoe, (after it had made its appearance above the earth for some time) broke off the stems, and kept the Potatoe and moistened it once every day with a solution or liquor made of the Artificial Manure, for the space of about three weeks, after which I set it in natural earth without any other manure, and it produced a fine healthy plant, entirely free from the Curl'd Topt disorder. This, and several other similar cases of the utility of this Manure, I have showed to several persons, who are witnesses to the truth thereof.

I do not give the above instance for a rule to be put into practice, but only to set forth the surprising effects that this Manure hath upon the worst of Potatoes; from which it is easy to infer what will be the effects thereof when applied to those that are in a tolerable sound state.

DIRECTIONS for using the Artificial Manure for Potatoes.

Direction 1. Each pound of the Manure is to be put into about four gallons of water, and stirred about until it dissolve, which it will do very soon.

Direction 2. When you put the Potatoes into the room, pye, or bed, (as I have showed in *Directions 3, 4, and 5, of the Essay*) each layer of Potatoes are to be well wet with the above liquor, before the earth or sand is put upon them, which may be done with a watering-pan, such as is used in watering gardens, or with any other convenient utensil. The liquor must be well stirred about before it is used.

Direction 3. Each pound of the Manure, with four gallons of water, is sufficient for about ten pecks of Potatoes, and so on in proportion, always allowing one pound of Manure for every ten pecks of Potatoes.

Note. The last layer of earth or sand that covers the uppermost layer of Potatoes must be very well moistened with the liquor.

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I have tried several methods of using this Manure, but that which I have directed seems to be preferable to any other; but those who choose to adopt a different method in using it, may do as they think proper, only I would caution them not to steep the Potatoes in the liquor; because if they do, (for any time together) the vegetative property will be entirely destroyed.

The quantity of water already specified for dissolving the Manure, answers very well in general. But as the earth or sand that the Potatoes are preserved in may be very different in its nature, dryness, &c. it will make a difference in the quantity of water which ought to be used; for it must be observed, that the earth or sand that the Potatoes are preserved in must only be made tolerably moist, and not so wet as to become like puddle, or the liquor to swim about amongst them; therefore earth that is moist, and abounds with clay, or is of a strong and close nature, will require less water than such as is dry, moorish, loose, or open.

If the above quantity of manure is used, the proportion of water for dissolving it is not very material, so as the earth or sand is only made tolerably moist. Care must be taken not to use too much water, for if the earth is made extravagantly wet, and the place where the pye or bed is made be of so moist a nature that it cannot take in the superfluous moisture, it will act, in some degree, as though the Potatoes were steeped.

Note. It is needless to apply this Manure to any Potatoes but such as are intended for sets.

I am certain that if these short *Directions* which I have given in the Essay are put into practice, they will in a few years infallibly cure the worst rank Curl'd Potatoes, and preserve them in great perfection, especially if the Artificial Manure is used: But I hope no person will be so unreasonable as to expect that either the Directions in the Essay, or Manure, or both of them together, will restore rank Curl'd Potatoes to a state of perfection in the space of one year. Those who choose

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to try the experiment with such Potatoes, will find them greatly improved the first year; much more so the next year; and in a year or two more they will be wholly restored to the greatest state of perfection. But such-like experiments as these are not (as I hinted before) intended for practice; therefore those persons who are desirous of curing the disorder as soon as possible, and of having Potatoes in perfection the next year, must make use of such as are in a tolerable degree of soundness, and then if the Artificial Manure is used there need be no doubt of the desired effect.

The Artificial Manure for Potatoes is prepared ONLY by the Author; and by his appointment sold by Mess. Wright and Prest, Mr. Tesleyman, and Mr. Spence, York; Mr. Locke and Mr. Grainger, Howden; Mr. Browne, Hull; Mr. Crosby, Pocklington; Mr. Hudson, Market-Weighton; and by the Author in Barmby.

* * The Artificial Manure is put up in small parcels of one pound each, price one shilling and fourpence, and labelled with the following words—*Raley's Artificial Manure for Potatoes, 1 Pound, Price 1s. 4d.* in his own hand-writing.

||§|| The price of the Essay is one shilling; but each purchaser of the Artificial Manure for Potatoes may (at the time when they purchase) have one of them for sixpence, at any of the places where the Manure is sold.

✿ A few of my former Treatises on the Management of Potatoes, &c. may yet be had of Mr. W. Tesleyman, and Mr. R. Spence, booksellers in York; to which is now added, gratis, An APPENDIX, containing an account of the Artificial Manure for Potatoes, with respect to its use, effects, &c. &c.

BARMBY, OCT. 4, 1782.



E R R A T A
In Treatise on the Management of Potatoes, page 26, line 17 from the top, for *of vivifying*, read, *AND vivifying*—Page 36, line 11 from the top, after the words, *forming into Potatoes*, add, *which will fall far short of the size of the other*.

